LARUS Hrvatska akademija znanosti i umjetnosti	56 (2021)	32 str. 2 tablice, 2 slike	Zagreb 2021.
	Primljeno 30.6.2021. Prihvaćeno na sjednici Razreda za prirodne znanosti HAZU 29.9.2021.		

UDK 598.9(497.5)

Original scientific paper
Izvorni znanstveni članak
DOI: 10.21857/y26kec4039

ORNITHOFAUNA IN THE AREA OF THE DANUBE–SAVA CANAL IN BERAVCI

Ornitofauna na području kanala Dunav-Sava u Beravcima

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ABSTRACT

Ornithofauna research in the area of the Danube–Sava canal between the villages of Beravci and Gundinci was conducted from March 2020 to June 2021. Ornithofauna was explored along the canal and on the canal, and in the surrounding agricultural areas and forest fragments covering approximately 6 km^2. A total of 134 bird species were recorded in the vicinity of the Danube–Sava canal, out of which 29 are included in the Red List of Birds of Croatia. 66 bird species bred on the research area. 15 species did not breed there, but used the area as a foraging area in the breeding season. 45 species were recorded as migratory birds, whilst 70 species were recorded as wintering birds. Given that this is the first study of the ornithofauna of this area, and that great diversity of the recorded species is present there, it is necessary to maintain the continuity of research in the future, with the aim of spreading knowledge and obtaining new data on the species of this area.

Keywords: irrigation canal, ornithofauna, East Croatia

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INTRODUCTION

Beravci is a place located in the eastern part of the Brod-Posavina County. In 2009, the digging of the so-called Danube–Sava Multipurpose Canal in Beravci started. The first documents on the connection between the Sava and the Danube rivers date back to 1737. So far, 14 variants of the solution for the route of the Danube–Sava canal have been made. The first projects considered the canal only for navigational purposes, while today's, the construction of a multi-purpose canal is envisaged. The three main functions of the canal should be navigation, drainage, irrigation, and improvement of small waters (Dundović & Vilke 2009). The construction of the DSMC (Danube–Sava Multipurpose Canal) project should shorten the main navigation route from the Sava in the direction of Central and Western Europe by 417 km, and in the direction of Eastern Europe by 85 km. The canal further enables the irrigation of 68,000 ha of agricultural land with favourable pedological properties, which is naturally insufficiently moist for intensive cultivation and the realization of high crop incomes in dry periods (Marušić 2017). The DSMC is a highly controversial project due to its environmental, ecological and economical impacts (Prpić 1999, Schneider-Jacoby 2000, 2001). However, recent study suggests that the existing part of the canal might be used for releasing water into the Spačva basin due to decreased humidity in the recent years; this is necessary for the development of forest vegetation (Glatz-Jorde *et al*. 2021). In 2007, project documentation was prepared, whilst in 2009, the operationalisation of this project began through pilot project Irrigation in the Republic of Croatia, which connects the Slavonian fields with the Sava river. In 2016, the supply reclamation canal was connected to the Sava in Jaruge. The canal is 15 km long and enables the supply of water from the Sava as an external source to the Bić watercourse and finally to the Bosut watercourse, which creates the preconditions for irrigating 8500 ha of agricultural land (Županjac.net 2021). Currently, no works are being carried out on the part of the canal that is connected to the Sava, which has led to the development of wetland vegetation and the settlement of species favoured by this type of habitat. This has consequently encouraged more intensive research of ornithofauna.

MATERIALS AND METHODS

Field research in the area of the Danube–Sava canal (Figure 1 & 2) conducted in the period from March 2020 to June 2021, a total of 15 months that included breeding, migration and wintering seasons of the birds. In the first few months, research area was visited daily, mainly in the morning after sunrise and in the afternoon, before sunset, since the activity of birds, and animals in general, is liveliest then. The rest of the research field visits were properly distributed in order to preserve continuity and record as much data as possible (Table 1).

Ornithofauna was explored along the canal and on the canal, and in the surrounding agricultural areas and forest fragments covering an area of about 6 km^2. Along the water surface of the canal, characteristic aquatic vegetation developed: Common reed *Phragmites australis* and Common cattail *Typha latifolia*. Two other significantly smaller canals, Moravnik and Berava, coming from the village direction towards the DSMC, are completely overgrown with False indigo-bush *Amorpha fruticosa*, which began to develop at the edges along the DSMC as well. As parts of the forest were removed at the sites of the DSMC route, there we find fragmented forest habitats dominated by Pedunculate oak *Quercus robur*, Common ash *Fraxinus excelsior*, and Common hornbeam *Carpinus betulus*. Agricultural areas are numerous, and a layer of shrubby plants developed along most of the fields, e.g. Common hawthorn *Crateagus monogyna* and Blackthorn *Prunus spinosa*. During each field trip, an absolute count of species was performed based on visual and sound observations. For each species, the IUCN status was determined according to the Croatian Red List of Birds (Tutiš *et al*. 2013). The presence in the study area for each month of the study and the status of the population (breeding, migratory, wintering) were also determined. Scientific names and systematics are in accordance with the Dictionary of Standard Croatian Bird Names from 2018 (Zavod za ornitologiju HAZU 2018). Data on the recorded bird species have been entered into the online database Observation (https://observation.org/). Some rare and interesting findings have also been entered into Fauna.hr (https://www.fauna.hr/).

Table 1. The number of field visits in individual months in the research period.
Tablica 1. *Broj terenskih izlazaka po mjesecima tijekom istraživanog razdoblja.*

	1	2	3	4	5	6	7	8	9	10	11	12
2020	-	-	10	21	16	9	6	5	9	12	11	10
2021	14	5	6	8	7	6	-	-	-	-	-	-
TOTAL	**14**	**5**	**16**	**29**	**23**	**15**	**6**	**5**	**9**	**12**	**11**	**10**

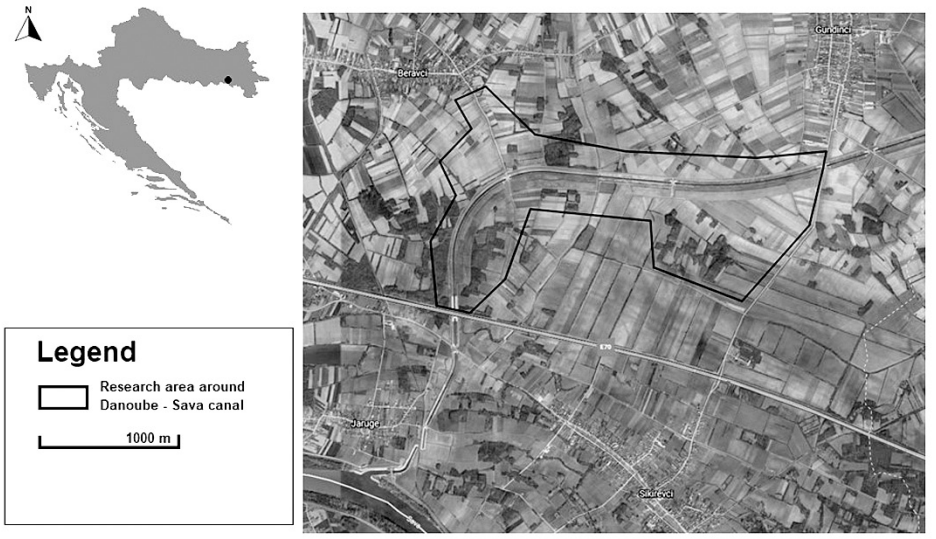

Figure 1. The location of the research area around the Danube–Sava canal
Slika 1. Smještaj područja istraživanja oko kanala Dunav – Sava

Figure 2. Danube–Sava canal at Beravci (Photo: Tomislav Mandir)
Slika 2. Kanal Dunav – Sava u Beravcima (Foto: Tomislav Mandir)

RESULTS

From March 2020 to June 2021, a total of 134 bird species were recorded in the vicinity of the Danube–Sava canal (Table 2). According to the presence in the research area, the species were divided into categories: breeding, migratory, and wintering birds. In the research area, 66 breeding species were recorded. 15 species did not breed in the research area, but used it as a foraging area during the breeding season. 45 species were recorded during spring and autumn migrations, whilst 70 species were wintering in the area. Out of the 134 bird species recorded, 29 (21.64%) are included in the Red List of Birds of Croatia.

Species list

COMMON QUAIL *Coturnix coturnix*

Present from April to September. The estimated breeding population is 3-4 pairs. The largest number of individuals (4) was recorded in May 2021.

COMMON PHEASANT *Phasianus colchicus*

Present throughout the research period. The estimated breeding population is 10 pairs. The largest number of individuals (12) was recorded in March 2021.

MUTE SWAN *Cygnus olor*

Present on the canal throughout the research period. In 2020 breeding was recorded in the part of the canal outside the research area. In the spring of 2021, an unsuccessful breeding attempt was recorded. The largest number of individuals (13) was recorded in February 2021.

COMMON SHELDUCK *Tadorna tadorna*

Two individuals were recorded in flight over the water surface on 24 December 2020. On 29 December 2020, a flock of 70 individuals was recorded during migration to the southwest.

FERRUGINOUS DUCK *Aythya nyroca*

Present on the canal during migration in April, August, and October 2020, and March 2021. The largest number of individuals (3) was recorded in April 2020 and March 2021.

GARGANEY *Spatula querquedula*

Present on the canal during migration in March and April 2020 and 2021. The largest number of individuals (8) was recorded in April 2020.

NORTHERN SHOVELER *Spatula cylpeata*

In the eastern part of the canal, two individuals, a male and a female, were recorded during March and April 2020, while in 2021 no individuals were recorded.

MALLARD *Anas platyrhynchos*

Present on the canal throughout the research period. The estimated breeding population is 3-4 pairs. The largest number of individuals (25) was recorded in October 2020.

COMMON TEAL *Anas crecca*

Present on the canal during migration in March and April 2020. Wintering was also recorded from October 2020 to March 2021. The largest number of individuals (7) was recorded in December 2020.

LITTLE GREBE *Tachybaptus ruficollis*

Present on the canal throughout the research period. The estimated breeding population is 5-6 pairs. The largest number of individuals (11) was recorded during October 2020.

FERAL DOVE *Columba livia forma domestica*

Present in the canal area throughout the research period. The estimated breeding population is 50-60 pairs on a nearby farm in the eastern part of the canal.

STOCK DOVE *Columba oenas*

Present during December 2020 and January 2021. It was recorded on several occasions. In December 2020, a smaller flock of about 15 individuals flew over the canal and the nearby forests.

COMMON WOOD-PIGEON *Columba palumbus*

Present in forest habitats throughout the research period. The estimated breeding population is 10 pairs. The largest number of individuals (45) was recorded in October 2020, when they were resting on electric power lines.

EUROPEAN TURTLE-DOVE *Streptopelia turtur*

Present on forest habitats from April to October. The estimate of the nesting population is 4-5 pairs. The largest number of individuals (4) was recorded in May 2021.

EURASIAN COLLARED-DOVE *Streptopelia decaocto*

Present throughout the research period. Breeds in the surrounding villages, and the largest number of individuals (8) was recorded in October in flight over the research area.

COMMON CUCKOO *Cuculus canorus*

Present from April to July. The estimated breeding population is 4-5 pairs. The largest number of individuals (5) was recorded in May 2021.

LITTLE CRAKE *Zapornia parva*

Present during the migration season. In March 2020 two individuals were recorded along the edge of the canal feeding on floating vegetation and hiding in reed.

COMMON MOORHEN *Gallinula chloropus*

Present on the canal throughout the research period. The estimated breeding population is 10 pairs. The largest number of individuals (14) was recorded in September 2020.

COMMON COOT *Fulica atra*

Present during the migration season and during the winter. The largest number of individuals (10) was recorded in January 2021.

COMMON CRANE *Grus grus*

Recorded in flight during the migration season from November 2020 to January 2021 in flocks of various sizes (50 - 300 individuals).

BLACK STORK *Ciconia nigra*

Present from March to September. Breeding in the wood nearby the canal. The nest is located on a Pedunculate oak at a height of about 20 meters. In 2020, there was one juvenile bird observed in the nest. The same pair was recorded in 2021 on the nesting territory.

WHITE STORK *Ciconia ciconia*

Present from April to September. The nearest nest is in the Gundinci village. The highest number of individuals (7) was recorded in May 2020 foraging in the canal area.

LITTLE BITTERN *Ixobrychus minutus*

Present on the canal from May to August 2020, and from April 2021 until the end of the research. It inhabits dense reeds. The estimated breeding population is 1-2 pairs. The largest number of individuals (4) was recorded in June 2020.

BLACK-CROWNED NIGHT-HERON *Nycticorax nycticorax*

Present in May 2020, when 2 individuals were seen feeding along the aquatic vegetation. Breeding has not been recorded.

SQUACCO HERON *Ardeola ralloides*

Present in May 2020 when 2 individuals were seen a few times feeding along the aquatic vegetation. Breeding has not been recorded.

GREY HERON *Ardea cinerea*

Present throughout the research period. It does not breed in the research area, but uses the canal and the surrounding agricultural fields for foraging. The largest number of individuals (29) was recorded in September 2020.

PURPLE HERON *Ardea purpurea*

Present from March to October. It does not breed in the research area, but uses it for foraging. The largest number of individuals (4) was recorded in April 2021.

GREAT WHITE EGRET *Ardea alba*

Present throughout the research period. The largest number of individuals (40) was recorded in October 2020 feeding on the canal and agricultural fields. During the summer months, it was seen individually or in smaller flocks, mostly in flight.

GREAT CORMORANT *Phalacrocorax carbo*

Present throughout the research period. During the winter months, 10 individuals were recorded feeding and wintering in the eastern part of the canal, while in the rest of the research period, they were recorded in flight.

NORTHERN LAPWING *Vanellus vanellus*

Present from March to November 2020, and from February 2021 until the end of the research. During this period, the largest number of individuals (8) was recorded in September feeding along the canal and agricultural fields. Eastwards of the study area towards Babina Greda, 36 individuals were recorded in October 2020, and 20 individuals in December 2020.

EURASIAN CURLEW *Numenius arquata*

Recorded on 8th September 2020 in flight over the canal in southwestern direction.

COMMON SNIPE *Gallinago gallinago*

Present in the canal area during the migration season in September and October 2020, as well as in the winter from January to April 2021. The largest number of individuals (6) was recorded in January.

COMMON SANDPIPER *Actitis hypoleucos*

Present on 23rd July 2020 feeding along the canal. It most likely came from the Sava river, given the short distance.

WOOD SANDPIPER *Tringa glaerola*

Present in the canal area during the migration season from March to May 2020, and in April 2021. The largest number of individuals (5) was recorded in April 2020.

WHISKERED TERN *Childonias hybrida*

Present from March to July. It does not breed in the study area, but uses it for foraging. The largest number of individuals (9) was recorded in May 2021.

COMMON BARN-OWL *Tyto alba*

One individual was present in April 2020 and observed during flight from an old linden trunk *Tilia* sp. near the canal. In December 2020, it was spotted next to an abandoned barn in the eastern part of the study area (observer: Domagoj Tomičić).

LITTLE OWL *Athene noctua*

One individual was present in November 2020 when it was identified by calling. No breeding was recorded in the research area. Several times observed in the Beravci village.

SHORT-EARED OWL *Asio flammeus*

One individual present on 22nd January 2021 resting along the edge of the canal in the early morning. Flew eastwards very quickly.

TAWNY OWL *Strix aluco*

One individual present from December 2020, when it was first recorded (observer: Domagoj Tomičić), until the end of the research. Recorded in an alley of old Ash trees full of hollows, about 20 meters away from the barn where the Common Barn-owl was observed.

EUROPEAN HONEY-BUZZARD *Pernis apivorus*

One individual was recorded in flight on 14th May 2020.

WESTERN MARSH-HARRIER *Circus aeruginosus*

Not present only in the winter months, from November 2020 to February 2021. From March to October 2020, 2 to 6 individuals were seen hunting along

the canal and the surrounding agricultural fields. Present in the entire research area, but the greatest number of individuals was observed in the eastern part, where the canal is wider and a major part thereof overgrown with reeds. Once, a male was seen carrying nesting material (reed stems), but the breeding site was probably further away from the research area.

NORTHERN HARRIER *Circus cyaneus*

Present from November 2020 to February 2021. Two individuals were recorded, a male and a female hunting along the canal.

MONTAGU'S HARRIER *Circus pygargus*

Present in April and May 2020 during migration season when a young male was spotted several times while hunting in the vicinity of the canal.

EURASIAN SPAROWHAWK *Accipiter nisus*

Present throughout the research period. The estimated breeding population is 2-3 pairs. The largest number of individuals (3) was recorded in October 2020.

NORTHERN GOSHAWK *Accipiter gentilis*

Present in April and May 2021, when one individual was recorded hunting. It probably breeds in the vicinity of the research area and uses the area for foraging.

WHITE-TAILED EAGLE *Halieaeetus albicilla*

Present from October to February. Two immature individuals were recorded, mainly in the eastern part of the research area.

RED KITE *Milvus milvus*

First recorded on 8th September 2020 in the early morning hours, hunting over agricultural fields, in the eastern part of the study area. After that, it was seen every following month in the same area. Two individuals were observed on 3rd January circling above a smaller grove. Assuming that there was a roosting site nearby, the wider area where they were seen was explored, unsuccessfully however. The last observation of the Red Kite was on 21st March. Considering recent attempt on breeding in Croatia (Tomik *et al*. 2019), the surrounding nests were checked, but kites were no longer observed.

BLACK KITE *Milvus migrans*

Present from April to October. In the spring of 2021, on 24th April a courtship and an attempt at mating was observed. Two weeks later a pair was seen building a nest on the edge of a forest fragment along an agricultural field near the canal on a Pedunculate oak. The breeding success is unknown.

COMMON BUZZARD *Buteo buteo*

Present in forest habitats throughout the research period. Foraging along the canal and the surrounding agricultural fields. The estimated breeding population is about 5 pairs. The largest number of individuals (13) was recorded in October 2020.

HOOPOE *Upupa epops*

Present in the canal area and the surrounding forests from April to October. The estimated breeding population is 2 pairs. The largest number of individuals (3) was recorded in May 2021.

EUROPEAN BEE-EATER *Merops apiaster*

Present in the canal area from April to August. Nesting along the entire length of the canal in smaller colonies with a total of 30-40 breeding pairs. The number of breeding pairs increased compared to 2020, when 15-20 pairs were recorded.

COMMON KINGFISHER *Alcedo atthis*

Present in the canal area throughout the research period. During the breeding season, one pair was recorded, while the largest number of individuals (3-4) was recorded in the winter.

EURASIAN WRYNECK *Jynx torquilla*

Present in smaller forest habitats and orchards from March to September. The estimated breeding population is 3-4 pairs. The largest number of individuals (4) was recorded in April.

GREY-FACED WOODPECKER *Picus canus*

Present in forest habitats from September until the end of the research period. The estimated breeding population is 1-2 pairs. The largest number of individuals (2) was recorded in October 2020.

EURASIAN GREEN WOODPECKER *Picus viridis*

Present in forest habitats from September 2020 to March 2021. It was not recorded during the breeding season.

BLACK WOODPECKER *Dryocopus martius*

Present in forest habitats throughout the research period. The estimated breeding population is 3-4 pairs. The largest recorded number of individuals (3) was in October 2021.

MIDDLE SPOTTED WOODPECKER *Leiopicus medius*

Present in forest habitats from October 2021 until the end of the research period. The estimated breeding population is 1-2 pairs. The largest number of individuals (2) was recorded in May 2021.

LESSER SPOTTED WOODPECKER *Dryobates minor*

Present in forest habitats in September and October 2020, and from January 2021 until the end of the research. The estimated breeding population is 1-2 pairs.

GREAT SPOTTED WOODPECKER *Dendrocopos major*

Present in forest habitats throughout the research period. The estimated breeding population is 10-15 pairs. The largest number of individuals (8) was recorded in February 2021.

COMMON KESTREL *Falco tinnunculus*

Present in forest habitats throughout the research period. The estimated breeding population is 3-4 pairs. The largest number of individuals (5) was recorded in September 2020.

RED-FOOTED FALCON *Falco vespertinus*

Present from 7th May 2020, when a male individual was spotted resting on the transmission line wire. In May, a total of 5 individuals were observed: 3 males and 2 females, near the same transmission line as the male recorded in early May. The last observation was on 29th May. In 2021, no individuals were observed.

MERLIN *Falco columbarius*

One individual was observed on 19th March 2021 hunting in the vicinity of the canal, in the eastern part of the research area. The individual flew away shortly after observation.

EURASIAN HOBBY *Falco subbuteo*

A male and a female were observed on 3rd May 2020, while resting on a dry branch of a Pedunculate oak. In the summer months, individuals are seen hunting. The largest number of individuals (4) was recorded in September 2020.

PEREGRINE FALCON *Falco peregrinus*

One individual was observed on 16th January 2021 hunting in the eastern part of the research area.

EURASIAN GOLDEN ORIOLE *Oriolus oriolus*

Present in forest habitats from May to August. The estimated breeding population is about 10 pairs. The largest number of individuals (7) was recorded in May 2021.

RED-BACKED SHRIKE *Lanius collurio*

Present from April to October, and inhabits shrubs along the forest edges and agricultural areas. The estimated breeding population is about 8 - 10 pairs. The largest number of individuals (12) was recorded in May 2021.

GREAT GREY SHRIKE *Lanius excubitor*

First recorded on 18 September 2020 and present during the winter months until February 2021. The largest number of individuals (3) was recorded in January 2021.

EURASIAN JAY *Garulus glandarius*

Present in forest habitats throughout the research period. The estimated breeding population is 10-15 pairs. The largest number of individuals (9) was recorded in October 2020.

BLACK-BILLED MAGPIE *Pica pica*

Present in forest habitats throughout the research period. The estimated breeding population is 2-3 pairs. The largest number of individuals (3) was recorded in October 2020.

EURASIAN JACKDAW *Corvus monedula*

One individual present in the vicinity of the canal in May and June 2020. During winter, from January to March 2021, up to 10 individuals were seen in a mixed flock with the Rook *Corvus frugilegus* and the Hooded Crow *Corvus corone cornix*, feeding on agricultural fields.

ROOK *Corvus frugilegus*

Present from November 2020 to March 2021 when flocks were seen feeding on agricultural fields. The largest number of individuals (150) was recorded in January 2021.

COMMON RAVEN *Corvus corax*

Present in forest habitats throughout the research period. Foraging on the canal and surrounding agricultural land. The estimated breeding population is 5-6 pairs. 4 nests were certainly recorded, 3 on transmission lines and 1 on a Pedunculate oak.

HOODED CROW *Corvus corone cornix*

Present in the canal area throughout the research period. The estimated breeding population is 5-10 pairs. The largest number of individuals (45) was recorded in January 2021.

MARSH TIT *Poacile palustris*

Present in forest habitat throughout the research period. A nesting site was found. The eastimated breeding population is 2 pairs.

EURASIAN BLUE TIT *Cyanistes caeruleus*

Present in forest habitats throughout the research period. The estimated breeding population is 3-5 pairs. The largest number of individuals (12) was recorded during the winter, in December 2020, when they were mostly seen feeding on reeds in the canal.

GREAT TIT *Parus major*

Present in forest habitats throughout the research period. The estimated breeding population is 10-15 pairs. The largest number of individuals (25) was recorded in December 2020.

WOOD LARK *Lullula arborea*

Present in the canal area in early January 2021. Four individuals were observed feeding in the snow along the canal.

EURASIAN SKYLARK *Alauda arvensis*

Present on meadows along the canal throughout the year. The estimated breeding population is 2-3 pairs. The largest number of individuals (20) was recorded in January 2021.

CRESTED LARK *Galerida cristata*

Present on agricultural fields along the canal throughout the research period. The estimated breeding population is 1-4 pairs. The largest number of individuals (6) was recorded in September 2020.

MOUSTACHED WARBLER *Acrocephalus melanopogon*

One singing male was observed on 5th April 2021 on the very edge of the eastern part of the study area, in dead reeds.

SEDGE WARBLER *Acrocephalus schoenobaenus*

Present in the canal area during migration season in September 2020 and April 2021, but also in May 2021. The largest number of individuals (4) was recorded in September 2020.

MARSH WARBLER *Acrocephalus palustris*

Present on the parts of the canal in dense vegetation with reeds from May to August. The estimated breeding population is 3-4 pairs. The largest number of individuals (3) was recorded in May 2021.

EURASIAN REED-WARBLER *Acrocephalus scirpaceus*

Present in the canal area from May to August. The estimated breeding population is 2-3 pairs. The largest number of individuals (2) was recorded in May 2021.

GREAT REED-WARBLER *Acrocephalus arundinaceus*

Present in the canal area from March to August. The estimated breeding population is 15 - 20 pairs. The largest number of individuals (30) was recorded in May 2021.

BARN SWALLOW *Hirundo rustica*

Present in the canal area from April to October. Nesting in the nearby villages and foraging on the canal and the surrounding agricultural fields. The largest number of individuals (30) was recorded in May 2021.

SAND MARTIN *Riparia riparia*

Present in the canal area from April to August. In 2020, about 50 pairs were breeding in an irregularly distributed colony, while in 2021, the number of breeding pairs dropped to 10-15.

WOOD WARBLER *Phylloscopus sibilatrix*

Present in forest habitats during the migration season from August to October 2020, and from April to May 2021. The largest number of individuals (7) was recorded in August 2020.

WILLOW WARBLER *Phylloscopus trochilus*

Present during the migration period in the research area. Observed several times in September 2020, and once in April 2021. The largest number of individuals (3) was recorded in September 2020.

COMMON CHIFFCHAF *Phylloscopus collybita*

Present in the canal area and forest habitats from September 2020 until the end of the research period. The estimated breeding population is 2-3 pairs. The largest number of individuals (4) was recorded in March 2021.

NORTHERN LONG-TAILED TIT *Aegithalos caudatus*

Present in forest habitats throughout the research period. The estimated breeding population is 5-7 pairs. The largest number of individuals (16) was recorded in October 2020.

BLACKCAP *Sylvia atricapilla*

Present in forest habitats from March to November. The estimated breeding population is 8-12 pairs. The largest number of individuals (7) was recorded in May 2020.

BARRED WARBLER *Sylvia nisoria*

Present on the edges of forests and shrubs between agricultural fields from May to August. The estimated breeding population is 4-5 pairs. The largest number of individuals (4) was recorded in May 2021.

LESSER WHITETHROAT *Sylvia curruca*

Present in shrubby habitats along the canal during migration in September and October, and from April to June. The largest number of individuals (2) was recorded in June 2021.

COMMON WHITETHROAT *Sylvia communis*

Present in shrubby habitats around the canal from May to August. The estimated breeding population is 5-7 pairs. The largest number of individuals (6) was recorded in May 2021.

SHORT-TOED TREECREEPER *Certhia brachydactyla*

Present in forest habitats, where one individual was observed on several occasions in December, January, April and May.

EURASIAN NUTHATCH *Sitta europaea*

Present in forest habitats throughout the study period. The estimated breeding population is 10-15 pairs. The largest number of individuals (9) was recorded in September 2020.

NORTHERN WREN *Troglodytes troglodytes*

Present in forest habitats and the canal in March and April 2020, and from October to April 2021. The largest number of individuals (5) was recorded in November 2020.

COMMON STARLING *Sturnus vulgaris*

Present in all habitat types throughout the research period. The estimated breeding population is 20-30 pairs. In April 2021, a flock of between 400 and 500 individuals was observed.

MISTLE THRUSH *Turdus viscivorus*

Present in forest habitats from October 2020 to March 2021. The largest number of individuals (6) recorded during the winter was in February 2021.

SONG THRUSH *Turdus philomelos*

Present in forest habitats and shrubs throughout the research period. The estimated breeding population is 10 pairs. The largest number of individuals (9) was recorded in October 2020.

REDWING *Turdus iliacus*

Present during the winter in December and January. The largest number of individuals (5) was recorded in December 2020, in a mixed flock with Fieldfares.

EURASIAN BLACKBIRD *Turdus merula*

Present in forest habitats and shrubs throughout the research period. The estimated breeding population is 10 pairs. The largest number of individuals (9) was recorded in January 2021.

FIELDFARE *Turdus pilaris*

Present from the early November to the end of February. Throughout the winter, flocks between 80 and 100 individuals were mostly observed. The largest number of individuals was recorded on 20th February 2021, when about 240 Fieldfares gathered on trees around the canal just before migration.

COMMON NIGHTINGALE *Luscinia megarhynchos*

Present in forest habitats from April to October. The estimated breeding population is 10 pairs. The largest number of individuals (12) was recorded in May 2021.

EUROPEAN ROBIN *Erithacus rubecula*

Present in forest habitats throughout the research period. The estimated breeding population is 4-8 pairs. The largest number of individuals (5) was recorded in January 2021.

SPOTTED FLYCATCHER *Muscicapa striata*

Present in forest habitats during migration season from August to October. The largest number of individuals (3) was recorded in September 2020.

EUROPEAN PIED FLYCATCHER *Ficedula hypoleuca*

Present in forest habitats during migration season. A male and a female were observed on 11th May 2020 on dry branches of a Pedunculate oak.

BLACK REDSTART *Phoenicurus ochruros*

Present in a shrubby habitat in the eastern part of the canal throughout the study. Nesting in nearby villages.

COMMON REDSTART *Phoenicurus phoenicurus*

Present on the edge of forest habitats during migration season. One male was observed in April 2020 and 2021.

WHINCHAT *Saxicola rubetra*

Present in the canal area from April to October. The estimated breeding population is 2-3 pairs. The largest number of individuals (3) was recorded in May 2021.

COMMON STONECHAT *Saxicola torqatus*

Present in the canal area and the surrounding agricultural areas throughout the research period. The estimated breeding population is between 5-8 pairs. The largest number of individuals (8) was recorded during May 2021.

NORTHERN WHEATEAR *Oenanthe oenanthe*

Present in the canal area and an agricultural field during migration season in April, May, September and October 2020, and in April 2021. The largest number of individuals (5) was recorded in April 2021.

GOLDCREST *Regulus regulus*

Present in forest habitats from November 2020 to March 2021. The largest number of individuals (7) was recorded in January 2021.

FIRECREST *Regulus ignicapilla*

One individual was observed on 15th December in the lower layer of the bushes on the forest edge.

DUNNOCK *Prunella modularis*

Present on forest edges and shrubs from November 2020 to February 2021. The largest number of individuals (2) was recorded in January.

HOUSE SPARROW *Passer domesticus*

Present on shrubs throughout the research period. Nesting in nearby villages. In the canal area feeding in a flocks with Tree sparrows.

EURASIAN TREE SPARROW *Passer montanus*

Present on shrubs throughout the research period. The estimated breeding population is 10 -15 pairs. The largest number of individuals (50) was recorded in January 2021.

TREE PIPIT *Anthus trivialis*

Present in the canal area and on the edges of forest habitats from April to October. The estimated breeding population is 5-6 pairs. The largest number of individuals (6) was recorded in May 2021.

MEADOW PIPIT *Anthus pratensis*

Present in the canal area from October 2020 to March 2021. Flocks were observed feeding on the canal and the surrounding meadows. The largest number of individuals (30) was recorded in January 2021.

WATER PIPIT *Anthus spinoletta*

Present in the canal area during migration in March and April 2020 and also January 2021. The largest number of individuals (10) was recorded in April 2020.

TAWNY PIPIT *Anthus campestris*

Present in the canal area in July 2020, when one individual was observed. In April 2020, two individuals were observed on an agricultural field near the canal.

YELLOW WAGTAIL *Motacilla flava*

Present in the canal area from March to September. The estimated breeding population is 10-15 pairs. The largest number of individuals (12) was recorded in May 2021.

WHITE WAGTAIL *Motacilla alba*

Present in the canal area throughout the research period. The estimated breeding population is 5-10 pairs. The largest number of individuals (30) was recorded in October 2021.

EURASIAN CHAFFINCH *Fringilla coelebs*

Present in forest habitats throughout the research period. The estimated breeding population is about 15 pairs. The largest number of individuals (65) was recorded in October 2020.

BRAMBLING *Fringilla montifringilla*

Three individuals were observed on 23rd October 2020 in a mixed flock with Eurasian Chaffinches and European Greenfinches.

HAWFINCH *Coccothraustes coccothraustes*

Present in forest habitats throughout the research period. Due to the small number of observed individuals, it is impossible to estimate the breeding population. The largest number of individuals (2) was observed in April 2021.

EUROPEAN GREENFINCH *Chloris chloris*

Present in forest habitats from October 2020 to February 2021 and from April and May 2021. The estimated breeding population is 5-10 pairs. The largest number of individuals (50) was observed in October 2021.

EURASIAN LINNET *Linaria cannabina*

Present from October 2020 to February 2021. The largest number of individuals (17) was recorded in December 2020.

EUROPEAN GOLDFINCH *Carduelis carduelis*

Present in the canal area throughout the research period. The estimated breeding population is 10-20 pairs. The largest number of individuals (50) was recorded in December 2020.

EUROPEAN SERIN *Serinus serinus*

One singing male was observed on a Black pine *Pinus nigra* in May 2020.

EURASIAN SISKIN *Spinus spinus*

One individual was observed in flight in January 2021.

CORN BUNTING *Emberiza calandra*

Present in the canal area from March to October. The estimated breeding population is about 10 pairs. The largest number of individuals (8) was recorded in April 2021.

YELLOWHAMMER *Emberiza citrinella*

Present in the canal area and shrubs throughout the study period. The estimated breeding population is 5-10 pairs. The highest number of individuals (26) was recorded in January 2021 during feeding after snowfall.

REED BUNTING *Emberiza schoeniclus*

Present on the canal from November to April. The highest number of individuals (30) was recorded in January 2021 feeding in the snow.

DISCUSSION

The great diversity of bird species (134) during 15 months of research indicates that the area and the surroundings of the Danube–Sava canal are important for breeding and foraging, as a part of the migration route, and as wintering place for many bird species. The main reason for great diversity is the presence of several types of fragmented habitats in a relatively small area, such as reed-covered water surfaces, steep earthen banks and embankments along the canal, mosaic forest and agricultural areas significantly affecting food sources and habitat selection. In Croatia, the number of ornithological researches in the areas of irrigation canals is relatively low, and almost no literature was found to compare the data. According to the research of irrigation canals near Darda (Tomik 2011), it was concluded that the number and diversity of breeding birds is higher than in a typical dry and isolated agricultural habitat. Furthermore, higher stages of succession of the canal and its surroundings contribute to a larger number of breeding species; this is indicated by a decrease in the number of breeding species in the area of Darda–Topolik in Baranja by 72.41% after cleaning the canal and removing vegetation. The dominant breeding species in the reed belt of the Danube–Sava canal is the Great Reed Warbler, which builds its nest in dense reed. A total of 5 species of reed warblers were recorded, among which the Moustached Warbler, a rare breeding species of continental Croatia, with only one known nesting site in Baranja (Crnković 2013), was recorded during the migration. Dense vegetation favours the nesting of the Little Grebe and the Common Moorhen, whose large number of individuals was recorded both during the breeding and the wintering seasons. The excavation of the canal and the formation of wetland habitat has also led to an increase in the numberi of insects; this

favours the feeding of many bird species in the surrounding agricultural and forest habitats. The sloping earthen banks of the canal are a suitable nesting habitat for the Sand Martin and the European Bee-eater. They nest along the full length of the canal in smaller colonies. The number of breeding pairs of Sand Martins in 2021 is declining compared to 2020, possibly due to harassment and easy access of predators. One of the factors for reducing the population of Sand Martins is the reduction of microlocations with fresh steep landslides that are crucial for their nesting (Grlica 2013). The European Bee-eater breeding population is growing. The Tawny Pipit breeds in open dry areas with a sandy or gravel surface, mainly in coastal Croatia (Mikulić *et al*. 2017). In the canal area, it was observed during the breeding season in a suitable habitat, but breeding was not confirmed. The presence of all types of woodpecker characteristic for lowland areas is also significant, primarily due to forest fragments with old trunks in the entire research area. Uncultivated open areas along the canal are a suitable food source for two breeding pairs of the Hoopoe. Their population in Croatia is predominantly distributed in the Mediterranean region and less common in mountainous and continental Croatia (Mikulić *et al*. 2017). The largest number of bird species was recorded in April and May, during spring migration. The Eurasian Curlew is a regular yet rare migratory bird in continental Croatia (Mikuška & Mikuška 1994); its migratory population is on the IUCN Red List of Birds of Croatia, as is the Red-footed Falcon. In Croatia, the Red-footed Falcon can be observed during the migration, and the first breeding was confirmed on the Pag island in 2018 (Klanfar 2018). In Croatia, the Merlin is a rare migrant and wintering species. In the research area the Merlin was observed at the end of March. In continental Croatia, it is rarer and less numerous than in coastal Croatia. The recent data show that in eastern Slavonia the Merlin is regularly recorded during the winter months in smaller numbers (Tutiš & Barišić 2013), so wintering in the vicinity of the study area is not excluded. In the winter months, birds of prey: the Red Kite, the White-tailed Eagle, the Hen Harrier and the Peregrine Falcon were recorded. In the Dilj mountain area, the nesting of 1-2 pairs of Peregrine Falcons is known (Budinski 2013a), while in the rest of Slavonia and Baranja it is possible to see them as a migrant or wintering birds (Mikuška 2016). Other significant recorded wintering species are the Short–eared Owl and the Redwing. The Redwing is a regular migratory and wintering species in Croatia. Its population is smaller than the Fieldflare population. Both species can be observed during the winter in mixed flocks (Budinski 2013). According to research conducted in Spain (Pomares *et al*. 2015) on irrigation canals near agricultural areas, the main factor of a large species diversity is dense reed and aquatic vegetation. As the uncontrolled spread of reed and other vegetation negatively affects the irrigation system, it is beeing removed, which affects the composition of bird populations. For now, in the area of the Danube–Sava canal, the reed is removed at the end of July, when

the breeding season is over. Reed close to the water was not cut, so birds were able to use it. The great species diversity is also a consequence of the low anthropogenic impact. The proximity of arable agricultural fields and increasingly intensive agriculture should not be neglected, as it, together with the release of harmful and toxic substances, may significantly affect biodiversity. Furthermore, a larger number of fishermen and visitors in the area has been noticed, whose activities disturb the breeding populations of Sand Martins, European Bee-eaters, warblers and other species close to water and aquatic vegetation. More specific research and monitoring of bird species need to be carried out in order to obtain better and more accurate data on their numbers and population density and, if necessary, to establish certain protection measures.

Acknowledgments

I would like to thank Jelena Kralj for all the help and guidance while writing this paper. I am grateful to Domagoj Tomičić for accompanying me during certain field visits. Also, thanks to the reviewers for their constructive comments.

References

Budinski, I. (2013): Mali drozd, *Turdus iliacus*, Redwing. pp. 156 in: Kralj J., Barišić, S., Tutiš V., Ćiković, D. (eds.) Atlas selidbe ptica Hrvatske. Hrvatska akademija znanosti i umjetnosti. Zagreb.

Budinski, I. (2013a): Sivi sokol, *Falco peregrinus*. pp. 191-192 in: Tutiš, V., Kralj, J., Radović, D., Ćiković, D., Barišić, S. (eds.) Crvena knjiga ptica Hrvatske. Ministarstvo zaštite okoliša i prirode i Državni zavod za zaštitu prirode, Zagreb.

Crnković, R. (2013): Crnoprugasti trstenjak, *Acrocephalus melanopogon.* pp. 122-123 in: Tutiš, V., Kralj, J., Radović, D., Ćiković, D., Barišić, S. (eds.): Crvena knjiga ptica Hrvatske. Ministarstvo zaštite okoliša i prirode, Državni zavod za zaštitu prirode, Zagreb.

Dundović, Č., Vilke, S. (2009): Izgradnja višenamjenskog kanala Dunav – Sava. Pomorstvo 2: 589-608.

Glatz-Jorde, S., Jorde, K., Köstenberger, L., Berger, V., Kirchmeir, H. (2021): Sava.Restore – Connecting the floodplains for a healthy alluvial forest. Feasibility Study for Spačva-Bosut Forest Restoration. Final Report. E.C.O. Institute of Ecology, Klagenfurt, 27 pp.

Grlica, I.D. (2013): Bregunica, *Riparia riparia.* pp. 215 – 216 in: Tutiš, V., Kralj, J., Radović, D., Ćiković, D., Barišić, S. (eds.): Crvena knjiga ptica Hrvatske. Ministarstvo zaštite okoliša i prirode, Državni zavod za zaštitu prirode, Zagreb.

Klanfar, T. (2018): Prvo zabilježeno gniježđenje crvenonoge vjetruše *Falco vespertinus* u Hrvatskoj. Larus: 53: 43-46.

López-Pomares, A., López--Iborra, G.M., Martín-Cantarino C. (2015): Irrigation canals in a semi-arid agricultural landscape surrounded by wetlands: Their role as a habitat for birds during the breeding season, Journal of Arid Environments: 118: 28-36.

Marušić, J. (2017): Višenamjenski kanal Dunav-Sava: Preduvjet za poboljšanje vodnog režima Bosuta, Hrvatske vode 25 (101): 177-188.

Mikulić, K., Majer, M., Zec, M., Čulig, P., Katanović, I. (2017): Indeks populacije čestih vrsta ptica na poljoprivrednim staništima. Izvještaj za 2015. i 2016. godinu. Udruga BIOM. Zagreb. 48 pp.

Mikuska, J., Mikuska T. (1994): Ptice Dunava na području Hrvatske. Anali Zavoda za znanstveni rad u Osijeku 10: 109-175.

Mikuska, T. (2016): Zimovanje sivog sokola *Falco peregrinus* u Osijeku tijekom zima 2014./2015. i 2015./2016. godine Larus: 51: 77-78.

Prpić, B. (1999) Jesu li šumarski stavovi prilikom investicijskog zahvaćanja u prostore nizinskih šuma u slučaju kanala Dunav-Sava i Hidroelektrane Novo Virje konzervativni? Šumarski list 123: 1

Radović, D., Kralj, J., Tutiš, V. (1999): Migration pattern and seasonal activity of waders at Draganić fishponds in NW Croatia. Wader Study Group Bulletin 90: 35-41.

Schneider-Jacoby, M. (2001): Der Donau-Save-Adria canal. Ein unrealistischer Plan verschlingt Mittel und Landschaft in Kroatien. Euronatur Info 21: 1-8.

Schneider-Jacoby, M. (2002): Kanal Dunav-Sava-Jadran. Utopijski plan koji guta sredstva i krajobraz u Hrvatskoj. Šumarski list 126: 29-34.

Tomik, A. (2011): Ornitofauna melioracijskih kanala u okolici Darde, diplomski rad, Odjel za biologiju, Osijek.

Tomik, A., Ledinšćak, J., Dvoržak, D., Kralj, J., Literák, I., Marušík, H., Vyhnal, S., Horal, D., Raab, R., Spakovszky, P., Steindl, J. (2019): Status of the Red Kite *Milvus milvus* in Croatia, based on telemetry research: spatiotemporal distribution and new breeding record. Larus 54: 7-22.

Tutiš, V., Barišić, S. (2013): Mali sokol, *Falco columbarius*. pp. 189 – 190: Tutiš, V., Kralj, J., Radović, D., Ćiković, D., Barišić, S. (ur.): Crvena knjiga ptica Hrvatske. Ministarstvo zaštite okoliša i prirode, Državni zavod za zaštitu prirode, Zagreb.

Tutiš, V., Kralj, J., Radović, D., Ćiković, D., Barišić, S. (ur.) (2013): Crvena knjiga ptica Hrvatske. Ministarstvo zaštite okoliša i prirode, Državni zavod za zaštitu prirode, Zagreb, 258 pp.

Zavod za ornitologiju HAZU (2018): Rječnik standardnih hrvatskih ptičjih naziva. https://www.info.hazu.hr/jedinice/zavod-za-ornitologiju-u-zagrebu/rjecnik-standardnih-hrvatskih-pticjih-naziva/ pristupljeno - 15.7.2021.

Županjac.net 2021: https://zupanjac.net/melioracijski-kanal-kod-jaruga-spojen-s-rijekom-savom - pristupljeno -15.6.2021.

SAŽETAK

Ornitofauna na području kanala Dunav – Sava u Beravcima istraživana je u razdoblju od ožujka 2020. do kraja lipnja 2021. godine, ukupno 15 mjeseci, čime su obuhvaćena razdoblja selidbe, gniježđenja i zimovanja ptica. Istraživanje je provedeno na području kanala i uz kanal te okolnim poljoprivrednim i šumskim fragmentima približne površine oko 6 km^2. Tijekom svakog obilaska provedeno je apsolutno prebrojavanje ptica na temelju vizualnih i zvučnih opažanja. Za svaku vrstu određen je IUCN status prema Crvenom popisu ptica Hrvatske, prisutnost na istraživanom području za svaki mjesec istraživanja te status populacije (gnijezdarica, preletnica, zimovalica). Istraživanjem je utvrđeno ukupno 134 vrste ptica od kojih se 29 vrsta nalazi na Crvenom popisu ptica Hrvatske. Za 66 vrste ptica određen je status gnjezdarica kanala, 15 vrsta se ne gnijezdi na kanalu ali ga koristi kao mjesto hranjenja u gnijezdećoj sezoni. 45 vrsta određene su kao preletnice, a 70 vrsta ptica kao zimovalice. Postojanost više tipova fragmentiranog staništa na relativno malom prostoru, poput vodene površine obrasle trskom, strmih zemljanih obala i nasipa uz kanal, mozaičkih šumskih i poljoprivrednih površina, znatno utječe na izvor hrane i izbor staništa za gniježđenje a samim time i na veliku raznolikost zabilježenih vrsta ptica. S obzirom da je ovo prvo istraživanje ornitofaune ovog područja i veliku raznolikost zabilježenih vrsta potrebno je provoditi ciljana istraživanja i monitoringe ptica kako bi se dobili bolji i precizniji podatci o njihovoj brojnosti i gustoći populacija te po potrebi uspostavile određene mjere zaštite.

Table 2. List of bird species in the area of the Danube - Sava canal

RE-br – Regionally Extinct breeding population, **CR** – Critically Endangered **EN** – Endangered, **VU** – Vulnerable, **NT** – Near Threatened, **LC** – Least Concern, **NA** – Not Applicable), **DD** - Data Deficient

B – breeding species, **F** – present in breeding season, but not breeding in research area, **M** – migratory species, **W** – wintering species

Tablica 2. *Popis vrsta ptica na području kanala Dunav – Sava*

RE-br *– Regionalno izumrle gnjezdarice,* ***CR*** *– kritično ugrožena* ***EN*** *– ugrožena,* ***VU*** *– osjetljiva,* ***NT*** *– gotovo ugrožena,* ***LC*** *– najmanje zabrinjavajuća,* ***NA*** *– neprikladna za procjenu),* ***DD*** *- nedovoljno poznata*

B *– gnjezdarica,* ***F*** *– prisutna u gnijezdećoj sezoni, ali se ne gnijezdi u istraživanom području,* ***M*** *– preletnica,* ***W*** *– zimovalica*

					2020										2021					
No.	**Scientific name**	**English name**	**Red List Croatia**	**Season**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**
1.	*Coturnix coturnix*	Common Quail	LC	B	-	-	+	+	+	+	+	-	-	-	-	-	-	-	+	+
2.	*Phasianus colchicus*	Common Pheasant	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3.	*Cygnus olor*	Mute Swan	LC	B,W	+	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+
4.	*Tadorna tadorna*	Common Shelduck	NA	M	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
5.	*Aythya nyroca*	Ferruginous Duck	NT	M	-	+	-	-	-	+	-	+	-	-	-	-	+	-	-	-
6.	*Spatula querquedula*	Garganey	NT	M	+	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-
7.	*Spatula clypeata*	Northern Shoveler	RE-br	M	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	*Anas platyrhynchos*	Mallard	LC	B,M,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9.	*Anas crecca*	Common Teal	LC	M,W	+	+	-	-	-	-	-	+	+	+	+	+	+	-	-	-
10.	*Tachybaptus ruficollis*	Little Grebe	LC	B,M,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
11.	*Columba livia f. domestica*	Feral Dove	LC	F	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
12.	*Columba oenas*	Stock Dove	VU	W	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
13.	*Columba palumbus*	Common Wood-pigeon	LC	B,M,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

					2020										2021					
No.	**Scientific name**	**English name**	**Red List Croatia**	**Season**	**3.**	**4.**	**5.**	**6.**	**7.**	**8.**	**9.**	**10.**	**11.**	**12.**	**1.**	**2.**	**3.**	**4.**	**5.**	**6.**
14.	*Streptopelia turtur*	European Turtle-dove	LC	B	-	-	+	+	+	+	+	+	-	-	-	-	-	+	+	+
15.	*Streptopelia decaocto*	Eurasian Collared-dove	LC	F,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
16.	*Cuculus canorus*	Common Cuckoo	LC	B	-	+	+	+	+	-	-	-	-	-	-	-	-	+	+	+
17.	*Zapornia parva*	Little Crake	EN	M	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.	*Gallinula chloropus*	Common Moorhen	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
19.	*Fulica atra*	Common Coot	LC	M,W	-	+	+	-	-	-	-	-	-	-	+	-	-	-	-	-
20.	*Grus grus*	Common Crane	LC	M	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-
21.	*Cicionia nigra*	Black stork	VU	B	+	+	+	+	+	+	-	-	-	-	-	-	-	+	+	+
22.	*Ciconia ciconia*	White stork	LC	F	-	-	+	+	+	+	-	-	-	-	-	-	-	+	+	+
23.	*Ixobrychus minutus*	Little Bittern	LC	B	-	-	+	+	+	-	-	-	-	-	-	-	-	-	+	+
24.	*Nycticorax nycticorax*	Black-crowned Night-heron	NT	M	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
25.	*Ardeola ralloides*	Squacco Heron	EN	M	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
26.	*Ardea cinerea*	Grey Heron	LC	F,M,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
27.	*Ardea purpurea*	Purple Heron	EN	F	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+
28.	*Ardea alba*	Great White Egret	EN	M	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
29.	*Phalacrocorax carbo*	Great Cormorant	NT	M,W	+	+	-	-	-	+	+	+	+	+	+	+	+	+	+	+
30.	*Vanellus vanellus*	Northern Lapwing	LC	F,M	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+
31.	*Numenius arquata*	Eurasian Curlew	VU	M	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
32.	*Gallinago gallinago*	Common Snipe	CR	M,W	-	-	-	-	-	-	+	+	-	-	+	+	+	+	-	-
33.	*Actitis hypoleucos*	Common Sandpiper	VU	M	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-

34.	*Tringa glareola*	Wood Sandpiper	LC	M	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-
35.	*Chlidonias hybrida*	Whiskered Tern	NT	F,M	-	+	+	+	+	+	-	-	-	-	-	-	-	-	+	+
36.	*Tyto alba*	Common Barn-owl	NT	B	-	+	-	-	-	-	-	-	-	+	-	-	-	-	-	-
37.	*Athene noctua*	Little Owl	NT	F	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-
38.	*Asio flammeus*	Short-eared Owl	NA	W	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
39.	*Strix aluco*	Tawny Owl	LC	B	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+
40.	*Pernis apivorus*	European Honey-buzzard	NT	M	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
41.	*Circus aeruginosus*	Western Marsh-harrier	EN	F,M	+	+	+	+	+	+	+	+	-	-	-	-	+	+	+	+
42.	*Circus cyaneus*	Northern Harrier	LC	W	-	-	-	-	-	-	-	-	+	+	+	+	-	+	-	-
43.	*Circus pygargus*	Montagu's Harrier	EN	M	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
44.	*Accipiter nisus*	Eurasian Sparrowhawk	LC	B,W	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+
45.	*Accipiter gentilis*	Northern Goshawk	LC	F	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
46.	*Haliaeetus albicilla*	White-tailed Eagle	VU	W	-	-	-	-	-	-	-	+	+	+	+	+	-	-	-	-
47.	*Milvus milvus*	Red Kite	RE-br	W	-	-	-	-	-	-	+	+	+	+	+	-	+	-	-	-
48.	*Milvus migrans*	Black Kite	EN	B	-	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+
49.	*Buteo buteo*	Common Buzzard	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
50.	*Upupa epops*	Hoopoe	LC	B	-	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+
51.	*Merops apiaster*	European Bee-eater	LC	B	-	-	+	+	+	+	+	-	-	-	-	-	-	+	+	+
52.	*Alcedo atthis*	Common Kingfisher	NT	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
53.	*Jynx torquilla*	Eurasian Wryneck	LC	B	-	+	+	+	+	+	-	-	-	-	-	-	-	+	+	+
54.	*Picus canus*	Grey-faced Woodpecker	LC	B,W	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+
55.	*Picus viridis*	Eurasian Green Woodpecker	LC	F,W	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-
56.	*Dryocopus martius*	Black Woodpecker	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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57.	*Leiopicus medius*	Middle Spotted Woodpecker	LC	B,W	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+
58.	*Dryobates minor*	Lesser Spotted Woodpecker	LC	B,W	-	-	-	-	-	-	+	+	-	-	+	+	-	+	+	+
59.	*Dendrocopos major*	Great Spotted Woodpecker	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
60.	*Falco tinnunculus*	Common Kestrel	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
61.	*Falco vespertinus*	Red-footed Falcon	DD	M	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
62.	*Falco columbarius*	Merlin	DD	M	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
63.	*Falco subbuteo*	Eurasian Hobby	NT	B	-	-	+	+	+	+	+	+	-	-	-	-	-	-	+	-
64.	*Falco peregrinus*	Peregrine Falcon	VU	W	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
65.	*Oriolus oriolus*	Eurasian Golden Oriole	LC	B	-	-	+	+	+	+	-	-	-	-	-	-	-	-	+	+
66.	*Lanius collurio*	Red-backed Shrike	LC	B	-	-	+	+	+	+	+	+	-	-	-	-	-	+	+	+
67.	*Lanius excubitor*	Great Grey Shrike	LC	W	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-	-
68.	*Garrulus glandarius*	Eurasian Jay	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
69.	*Pica pica*	Black-billed Magpie	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
70.	*Corvus monedula*	Eurasian Jackdaw	LC	M,W	-	+	+	-	-	-	-	-	-	-	+	+	+	-	-	-
71.	*Corvus frugilegus*	Rook	LC	F,W	-	-	-	-	-	-	-	-	+	+	+	+	+	-	-	-
72.	*Corvus corax*	Common Raven	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
73.	*Corvus corone cornix*	Hooded Crow	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
74.	*Poacile palustris*	Marsh Tit	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
75.	*Cyanistes caeruleus*	Eurasian Blue Tit	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

76.	*Parus major*	Great Tit	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
77.	*Lullula arborea*	Wood Lark	LC	W	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
78.	*Alauda arvensis*	Eurasian Skylark	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
79.	*Galerida cristata*	Crested Lark	LC	B,W	+	+	+	+	+	-	+	+	-	+	+	+	+	+	+
80.	*Acrocephalus melanopogon*	Moustached Warbler	CR	M	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
81.	*Acrocephalus schoenobaenus*	Sedge Warbler	LC	M	-	-	-	-	-	-	+	-	-	-	-	-	-	+	+
82.	*Acrocephalus palustris*	Marsh Warbler	LC	B	-	-	+	+	+	+	-	-	-	-	-	-	-	-	+
83.	*Acrocephalus scirpaceus*	Eurasian Reed-warbler	LC	B	-	-	+	+	+	+	-	-	-	-	-	-	-	-	+
84.	*Acrocephalus arundinaceus*	Great Reed-warbler	LC	B	+	+	+	+	+	+	-	-	-	-	-	-	-	+	+
85.	*Hirundo rustica*	Barn Swallow	LC	F	-	+	+	+	+	+	+	-	-	-	-	-	-	+	+
86.	*Riparia riparia*	Sand Martin	VU	B	-	-	+	+	+	+	-	-	-	-	-	-	-	+	+
87.	*Phylloscopus sibilatrix*	Wood Warbler	LC	M	-	-	-	-	+	+	+	-	-	-	-	-	-	+	+
88.	*Phylloscopus trochilus*	Willow Warbler	NT	M	-	-	-	-	-	-	+	-	-	-	-	-	-	+	-
89.	*Phylloscopus collybita*	Common Chiffchaf	LC	B,W	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+
90.	*Aegithalos caudatus*	Northern Long-tailed Tit	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
91.	*Sylvia atricapilla*	Blackcap	LC	B	+	+	+	+	+	+	+	+	-	-	-	-	+	+	+
92.	*Sylvia nisoria*	Barred Warbler	LC	B	-	+	+	+	+	-	-	-	-	-	-	-	-	-	+
93.	*Sylvia curruca*	Lesser Whitethroat	LC	M	-	-	-	-	-	-	+	+	-	-	-	-	-	+	+
94.	*Sylvia communis*	Common Whitethroat	LC	B	-	-	+	+	+	+	+	-	-	-	-	-	-	+	+
95.	*Certhia brachydactyla*	Short-toed Treecreeper	LC	B,W	-	-	-	-	-	-	-	-	-	+	+	-	-	+	+
96.	*Sitta europaea*	Eurasian Nuthatch	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
97.	*Troglodytes troglodytes*	Northern Wren	LC	M,W	+	+	-	-	-	-	-	+	+	+	+	+	+	-	-

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98.	*Sturnus vulgaris*	Common Starling	LC	B,M,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
99.	*Turdus viscivorus*	Mistle Thrush	LC	W	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-
100.	*Turdus philomelos*	Song Thrush	LC	B,W	+	+	+	+	+	-	+	+	+	-	+	+	+	+	+	+
101.	*Turdus iliacus*	Redwing	LC	W	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
102.	*Turdus merula*	Eurasian Blackbird	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
103.	*Turdus pilaris*	Fieldfare	NA	W	-	-	-	-	-	-	-	-	+	+	+	+	+	-	-	-
104.	*Luscinia megarhynchos*	Common Nightingale	LC	B	-	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+
105.	*Erithacus rubecula*	European Robin	LC	B,W	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+
106.	*Muscicapa striata*	Spotted Flycatcher	LC	M	-	-	-	-	+	+	+	-	-	-	-	-	-	-	-	-
107.	*Ficedula hypoleuca*	European Pied Flycatcher	LC	M	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
108.	*Phoenicurus ochruros*	Black Redstart	LC	F,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
109.	*Phoenicurus phoenicurus*	Common Redstart	LC	M	-	+	-	-	-	-	-	-	-	-	-	-	-	+	+	+
110.	*Saxicola rubetra*	Whinchat	LC	B	-	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+
111.	*Saxicola torqatus*	Common Stonechat	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
112.	*Oenanthe oenanthe*	Northern Wheatear	LC	M	-	+	+	-	-	-	+	+	-	-	-	-	-	+	-	-
113.	*Regulus regulus*	Goldcrest	LC	W	-	-	-	-	-	-	-	-	+	+	+	+	+	-	-	-
114.	*Regulus ignicapilla*	Firecrest	LC	W	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-
115.	*Prunella modularis*	Dunnock	LC	W	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-
116.	*Passer domesticus*	House Sparrow	LC	F,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
117.	*Passer montanus*	Eurasian Tree Sparrow	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

118.	*Anthus trivialis*	Tree Pipit	LC	B	-	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+
119.	*Anthus pratensis*	Meadow Pipit	LC	W	-	-	-	-	-	-	-	+	+	+	+	+	+	-	-	-
120.	*Anthus spinoletta*	Water Pipit	LC	M	+	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-
121.	*Anthus campestris*	Tawny Pipit	LC	M	-	-	-	-	+	-	-	-	-	-	-	-	-	+	-	-
122.	*Motacilla flava*	Yellow Wagtail	LC	B	+	+	+	+	+	+	+	-	-	-	-	-	-	+	+	+
123.	*Motacilla alba*	White Wagtail	LC	B,M,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
124.	*Fringilla coelebs*	Eurasian Chaffinch	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
125.	*Fringilla montifringilla*	Brambling	LC	M	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
126.	*Coccothraustes coccothraustes*	Hawfinch	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
127.	*Chloris chloris*	European Greenfinch	LC	B,W	-	-	-	-	-	-	+	+	+	+	+	+	-	+	+	-
128.	*Linaria cannabina*	Eurasian Linnet	LC	W	-	-	-	-	-	-	-	+	+	+	+	+	-	-	-	-
129.	*Carduelis carduelis*	European Goldfinch	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
130.	*Serinus serinus*	European Serin	LC	M	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
131.	*Spinus spinus*	Eurasian Siskin	LC	W	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-
132.	*Emberiza calandra*	Corn Bunting	LC	B	+	+	+	+	+	+	+	+	-	-	-	-	+	+	+	+
133.	*Emberiza citrinella*	Yellowhammer	LC	B,W	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
134.	*Emberiza schoeniclus*	Reed Bunting	LC	W	+	+	-	-	-	-	-	-	+	+	+	+	+	+	-	-